

TITLE OF THE INVENTION
INFORMATION INPUT DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application is based upon and claims the
benefit of priority from the prior Japanese Patent
Application No. 11-301400, filed October 22, 1999, the
entire contents of which are incorporated herein by
reference.

BACKGROUND OF THE INVENTION

10 This invention relates to an information input
device, such as a scanner, incorporated in a digital
copy machine connected to a network, for scanning
images on a document, registering, in a database, the
images, and retrieving the images registered in the
15 database.

There is a conventional information input device,
such as a scanner connected to a network, which has a
function of reading document images, registering them
in a storage, and retrieving the registered images.
20 For example, a digital copy machine connected to a
network can be used as an information input device
having such a function. This digital copy machine
reads document images using its scanner section for
reading images, and registers the read images in a
25 server connected to the network. At this time, the
digital copy machine registers the document images and
also attribute information corresponding thereto. On

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the basis of, for example, the attribute information, the document images registered in the server are retrieved.

Japanese Patent Application KOKAI Publication
5 No. 10-312456 discloses a technique for realizing such a function. When, in this technique, a start button incorporated in a digital copy machine has been turned on, image input means and attribute information creating means incorporated in the machine create image
10 data and attribute information, respectively. The image data and the attribute information are transferred by transfer means to storage means incorporated in that server on a network, to which a network address stored in the address storage means of
15 the digital copy machine is assigned. The image data and the attribute information are published by publishing means incorporated in the server, and can be accessed through, for example, the access means of a data-retrieving personal computer on the network.

20 Further, there is a technique for reading a document while attaching a header sheet and a trailer sheet thereto, and registering the document in an image database and information concerning the document in a registry database.

25 Japanese Patent Application KOKAI Publication No. 62-267876 discloses a technique for realizing this function. This technique relates to an image

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registering system for use in an image file apparatus
for registering document images. The image file
apparatus comprises a registry database for retrieving
a registered document, an image database storing images
on each registered document, a registry matter database
registering connection data to be used for making the
registry database correspond to the image database,
input means for inputting a document to obtain image
data corresponding thereto, recognition means for
recognizing alphanumeric characters or other signs from
image data, and control means for controlling the
aforementioned databases, the input means and the
recognition means so as to process data. When
registering images on a document, a header sheet and a
trailer sheet are respectively provided before the
front cover and after the back cover of the document
that is in the form of a composite volume and has its
pages arranged in ascending order or in descending
order, or before the front cover and after the back
cover of a document that is in the form of sheets
including common data. The header sheet has at least
first, second and third symbol frames -- the first
symbol frame that records a symbol indicating whether
the document is in the form of a composite volume or in
the form of slips, a symbol indicating whether data is
printed on both sides of each page of the document or
on one side thereof, a symbol indicating a front side

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or a back side when data is printed on both sides of each page of the document, or a symbol indicating whether the document pages are arranged in ascending order or in descending order; at least two second
5 symbol frames that record the classification or document number of the document pages; and the third symbol frame that records a symbol indicating whether the sheet is the header sheet or the trailer sheet --. The header sheet, the document in the form of a
10 composite volume or in the form of slips, and the trailer sheet are input in this order via the input means, and the symbols recorded in the symbol frames recognized by the recognition means, thereby making documents, stored in the registry database and the
15 image database, correspond to each other.

In the above-described prior techniques, it is necessary to individually execute processing for registering document images in a voluntarily selected folder, and processing for registering, into a full-
20 text-search database, the result of character recognition processing (OCR processing) executed on the registered document images. Thus, OCR processing is executed after images on each document are registered. Therefore, it is troublesome to execute document image
25 registration and character recognition processing for retrieving document images.

Moreover, when, in the prior technique, executing

OCR processing to retrieve a registered document image, operation buttons for setting conditions to increase the efficiency of OCR processing cannot be prepared in advance for various types of document images.

5 Accordingly, when executing OCR processing, an operation button suitable for each document image cannot be selected.

As described above, when, in the prior art, automatically executing OCR processing on scanned document images, the user must operate various setting means for enhancing OCR processing, in addition to the scanning/inputting operation of document images. This means that time and effort are required for correction executed after the scanning operation, and high character recognizing accuracy cannot be obtained.

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BRIEF SUMMARY OF THE INVENTION

Since, when automatically executing the character recognition processing as described above, various types of setting means for enhancing character recognition processing are separated from document image input means, time and effort are required to register a document image or to execute correction after scanning the document image, and/or appropriate character recognition accuracy cannot be obtained. The present invention has been developed to solve these problems, and aims to provide an information input device which is easy for the user to use and capable of

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efficiently retrieving a registered document image with maximum character recognition accuracy.

To attain the aim, there is provided an information input device comprising: an image reading section for reading images on each of documents; a character recognition section for subjecting, to character recognition processing, the images read by the image reading section; a display section for displaying various types of instruction buttons; a management section for managing set contents corresponding to each of the instruction buttons displayed on the display section, the set contents including a destination of registration of the images read by the image reading section, and contents of processing executed on the images by the character recognition section; and a control section for executing control, when one of the instruction buttons has been designated, on the basis of the set contents corresponding to the one of the instruction buttons and managed by the management section, the control section controlling the image reading section so as to read the images, controlling the character recognition section so as to execute character recognition processing on the read images, and simultaneously registering the read images and a result of character recognition processing executed on the read images.

Additional objects and advantages of the invention

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will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and
5 obtained by means of the instrumentalities and combinations particularly pointed out hereinafter.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

The accompanying drawings, which are incorporated in and constitute a part of the specification,
10 illustrate presently preferred embodiments of the invention, and together with the general description given above and the detailed description of the preferred embodiments given below, serve to explain the principles of the invention.

15 FIG. 1 is a schematic block diagram illustrating a network system to which first to seventh embodiments of the invention are applicable;

FIG. 2 is a schematic block diagram illustrating another network system to which the first to seventh
20 embodiments of the invention are applicable;

FIG. 3 is a view showing an example of a display screen displaying instruction buttons;

FIG. 4 is a view showing an example of a display screen displaying other instruction buttons;

25 FIG. 5 is a view illustrating an example of a display screen for preparing an instruction button;

FIG. 6 is a flowchart illustrating the flow of

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FIG. 7 is a view showing an example of a display screen displaying other instruction buttons;

FIG. 8 is a view useful in explaining the contents of a management table;

FIG. 9 is a view illustrating an example of a display screen for preparing an instruction button for each purpose;

FIG. 10 is a view showing an example of a screen for retrieving a document image;

FIG. 11 is a flowchart illustrating the flow of processing executed in the second embodiment of the invention;

FIG. 12 is a flowchart illustrating the flow of processing executed in the third embodiment of the invention;

FIG. 13 is a flowchart illustrating the flow of processing executed in the fourth embodiment of the invention;

FIG. 14 is a flowchart illustrating the flow of processing executed in the fifth embodiment of the invention;

FIG. 15 is a flowchart illustrating the flow of processing executed in the sixth embodiment of the invention;

FIG. 16 is a view illustrating an example of a

printed page for confirming a processing result;

FIG. 17 is a flowchart illustrating the flow of processing executed in the seventh embodiment of the invention;

5 FIG. 18 is a schematic block diagram illustrating another network system according to the first to seventh embodiments of the invention;

10 FIG. 19 is a flowchart illustrating the flow of processing executed in an eighth embodiment of the invention; and

FIG. 20 is a view showing an example of data stored in an operation log.

DETAILED DESCRIPTION OF THE INVENTION

15 First to eighth embodiments of the invention will be described with reference to the accompanying drawings.

20 FIGS. 1 and 2 show examples of network systems which include an information input device according to each of first to eighth embodiments of the invention. Each network system comprises a network scanner (digital copier) 1 as an information input device, a personal computer for data retrieval (external device) 2, a document management server 3, and a LAN 4.

25 As shown in FIG. 1, the network scanner 1 includes a control section 11, an image input section (image reading section) 12, an OCR processing section (character recognition section) 13, a display 14, a

management section 15, a memory 16, etc. The network scanner 1 is a device for scanning images on a document made of, for example, paper, to create electronic image data.

5 The control section 11 controls the entire scanner. The image input section 12 optically scans a document made of, for example, paper to thereby read images thereon. The OCR processing section 13 executes character recognizing processing (OCR processing) on a
10 character or a symbol from the read images. The display 14 is provided on an operation panel (not shown) and contains a touch panel 14a. The display 14 displays guidance on operation, the set contents, or instruction buttons for inputting operation
15 instructions. The management section 15 has a management table 15a for managing, for example, the set contents for designating processing assigned to each instruction button. The memory 16 temporarily stores various types of data, or stores image data, text data,
20 etc. transmitted from an external device via a network.

 Although the network scanner 1 corresponds to the image input device in FIG. 1, it may be a device, such as a digital copy machine 1 as shown in FIG. 2, which has an image input function, a printing function, etc.
25 In this case, as shown in FIG. 2, the digital copy machine 1 mainly includes a printer section 17 for forming an image on an image forming medium such as a

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copy sheet of paper, in addition to the structural elements of the network scanner shown in FIG. 1.

The network scanner (digital copy machine) 1 is connected to a LAN 4, to which a document management server 3 and a personal computer 2 for data retrieval are connected. The personal computer 2 has a display 2a, an operation section, etc., and is used to retrieve document images from the document management server 3.

The document management server 3 is a device for storing and managing document images input from the network scanner 1. The document management server 3 includes an image database (DB) 32 for managing images using folders, and a full-text-search database (DB) 31 for storing text data. The image database 32 manages each document image as a document metaphor in a folder, and folders used therein are arranged in a tree structure.

The full-text-search database 31 stores text data which comprises character codes indicating characters or character candidates, and which are obtained as a result of OCR processing executed on images. The text data stored in the full-text-search database 31 is used when the personal computer 2 executes data retrieval depending upon whether or not a keyword is included in the text data.

The first embodiment of the invention will now be described.

FIG. 3 shows an example of a display screen of the display 14 of the network scanner 1, which displays instruction buttons realized by the touch panel 14a. In this example, the display 14 displays four
5 instruction buttons 51 - 54, a read start button 55 for inputting an instruction to start image reading, and operation guidance.

The instruction buttons 51 - 54 are used to input an instruction to execute processing based on the set
10 contents managed by the management table 15a. Specifically, when each of the instruction buttons 51 - 54 has been touched, images on a document are scanned and input (read) on the basis of the set contents in the management table 15a, thereby executing COR
15 processing on the input images and registering the input images and the OCR processing result.

The instruction button 51 is labeled "BUSINESS DAILY REPORT (FRONT COVER OCR)". This button is used to execute the process of registering the images on a
20 scanned document in a folder labeled "BUSINESS DAILY REPORT" and contained in the image database 32, and the process of executing OCR processing on only the front cover (1 page) of the scanned document and then registering the OCR processing result in the full-text-
25 search database 31.

Accordingly, when the instruction button 51 is touched, images on the scanned document are registered

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as images on a new document in the folder labeled "BUSINESS DAILY REPORT", and also subjected to OCR processing. This processing result is registered in the full-text-search database 31.

5 The instruction button 52 is labeled "BUSINESS COST ESTIMATION (ALL PAGE OCR)". This button is used to register images on a scanned document as images on a new document in the folder labeled "BUSINESS COST ESTIMATION (ALL PAGE OCR)", and execute OCR processing
10 on all pages of the document, thereby registering the OCR processing result in the full-text-search database 31.

 The instruction button 53 is labeled "CHECKOUT RECEIPT (FRONT COVER OCR)" and used to register a
15 checkout receipt. This button is used to register images on a scanned document as images on a new document in a folder labeled "CHECKOUT RECEIPT", and executes OCR processing on only the front cover
 (1 page) of the scanned document and then registering
20 the OCR processing result in the full-text-search database 31.

 The instruction button 54 is labeled "CUSTOMER MAP (FRONT COVER OCR)" and used to register a customer map in the same manner as in the case of the instruction
25 buttons 51 - 53. This button is used to register images on a scanned document as images on a new document in a folder labeled "CUSTOMER MAP", and

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executes OCR processing on only the front cover
(1 page) of the scanned document and then registering
the OCR processing result in the full-text-search
database 31.

5 Further, as shown in FIG. 3, a lower left portion
of the display screen displays an instruction message
for the user. In the example shown in FIG. 3, the
operation guidance "please set a document and push the
process button to start its reading" is displayed. In
10 addition, the instruction button 55 labeled "START
READING" to start reading of document images and to
register them on the basis of the set contents in the
selected process button is provided at a lower right
portion of the display screen.

15 Using the above display screen, the user selects
one of the instruction buttons 51 - 54 in accordance
with a destination into which a to-be-input document
should be registered, and pushes the instruction button
55 to start the process. The range of pages of a to-
20 be-read document, which are subjected to OCR processing,
is set in the management table 15a of the management
section 15 for each destination of registration
corresponding to the instruction buttons 51 - 54.

FIG. 4 shows an example of a display screen at
25 which an appropriate instruction button can be selected
in accordance with the language or the font of the
printed characters of a to-be-input document. As shown

in FIG. 4, instruction buttons 61 - 64 are supposed to be selectively used when the destination folder in which a to-be-scanned document is registered is a "CONTRACT DOCUMENT". The procedure after the document is set and until it is registered is similar to that shown in FIG. 2.

If, for example, the to-be-scanned contract document is written in Japanese, and the character pitch is fixed, the instruction button 61 labeled "JAPANESE; FIXED PITCH" is selected. In the case of a Japanese contract document using a character pitch other than the fixed one, the instruction button 62 labeled "JAPANESE; STANDARD PITCH" is selected.

On the other hand, if the to-be-scanned contract document is written in English, and the letter pitch is proportional, the instruction button 63 labeled "ENGLISH; PROPORTIONAL" is selected. In the case of an English contract document using a fixed letter pitch, the instruction button 64 labeled "ENGLISH; FIXED FONT" is selected.

Selection of an instruction button suitable for the feature of a to-be-input document enables OCR processing suitable for input document images, thereby enhancing the efficiency of recognition of characters (letters).

In the first embodiment, the instruction buttons, which are realized on the display 14 using the touch

panel 14a, can be prepared voluntarily by the user, using a preparation screen. FIG. 5 illustrates an example of data input in an instruction button preparation screen. More specifically, FIG. 5 shows a preparation screen for preparing the "BUSINESS DAILY REPORT" button shown in FIG. 3. The contents set for the instruction button using the preparation screen are written as the attribute data of the button into the management table 15a of the management section 15, and managed by it.

As is shown in FIG. 5, the preparation screen of the instruction button displays setting items such as "PANEL NAME", "BUTTON NAME", "REGISTRATION DESTINATION FOLDER NAME", "WHETHER OR NOT OCR PROCESSING IS EXECUTED", "DICTIONARY USED FOR CHARACTER RECOGNITION", "PRINTING FOR CONFIRMATION", "DOCUMENT SEPARATOR RECOGNITION", "DOCUMENT AUTOMATIC SEPARATION", "LANGUAGE FOR OCR SETTING", "CHARACTER PITCH FOR OCR SETTING", "RANGE OF PROCESSING FOR OCR SETTING", etc.

The item "PANEL NAME" is for setting the name of a panel (the name of a display screen) to which the to-be-prepared instruction button belongs. The item "BUTTON NAME" is for setting the name of the to-be-prepared instruction button, and the button name is displayed as the instruction button.

The item "REGISTRATION DESTINATION FOLDER NAME" is set for designating the name of a folder in which

images input using a selected instruction button are registered. The item "WHETHER OR NOT OCR PROCESSING IS EXECUTED" designates whether or not the input document images should be subjected to OCR processing.

5 The item "DICTIONARY USED FOR CHARACTER RECOGNITION" is set for designating a dictionary to be used in the case of executing OCR processing. The item "PRINTING FOR CONFIRMATION" is set for designating whether or not a registered document image should be
10 printed for confirmation. The item "DOCUMENT SEPARATOR RECOGNITION" is set for designating whether or not the end of each of a plurality of documents input at one time should be automatically recognized by recognizing each separator.

15 The item "DOCUMENT AUTOMATIC SEPARATION" is set for designating whether or not the documents should be automatically separated and registered when a separator has been detected. The items "LANGUAGE FOR OCR
20 SETTING", "CHARACTER PITCH FOR OCR SETTING" and "RANGE OF PROCESSING FOR OCR SETTING" are set for designating the language, the character pitch and the range of the to-be-processed pages of the document as configuration elements for OCR processing, respectively.

25 FIG. 6 is a flowchart useful in explaining processing executed in the first embodiment. Specifically, FIG. 6 illustrates the flow of processing executed from the scanning of a document to the

registration of its images in a folder in accordance with an instruction using an instruction button as shown in FIG. 3 or 4.

First, the user designates the name of a panel (the name of a display screen) to which a to-be-used instruction button belongs. Then, the instruction buttons that belong to the panel designated by the user through the touch panel 14a of the display 14 are displayed. The user selects one of the instruction buttons (step ST1). Subsequently, the control section 11 reads attribute data corresponding to the selected instruction button from the management table 15a of the management section 15 (step ST2).

The control section 11 then sets a configuration for inputting images on the basis of data read from the management table 15a (step ST3). After the user touches the read start button, the control section 11 starts input of images through the image input section 12 (step ST4).

Further, the control section 11 sets a configuration (mode) for OCR processing on the basis of the set contents of the selected instruction button, which concern OCR processing and are read from the management table 15a of the management section 15 (step ST5). Upon inputting images, the control section 11 executes OCR processing on the input images under the set OCR processing configuration (step ST6).

At this time, the range of execution of OCR processing is determined based on the contents set in the management table 15a. For example, the range of execution of OCR processing, such as the full text (all pages), only the front cover (the first page), or pages between designated pages, is set for a plurality of read images.

After OCR processing is executed on the read images, the control section 11 registers them in a folder contained in the image database 32 and designated in the management table 15a in accordance with the selected instruction button (step ST7). Subsequently, the control section 11 registers, in the full-text-search database 31, text data (a text document) resulting from OCR processing, together with information indicating the image storing place (folder) (step ST8).

After registering the OCR processing result and the images, the control section 11 writes the processing result into an operation log table 15b described later (step ST9), and finishes the process related to the selected instruction button.

As described above, the invention is characterized by the instruction button that is provided for simultaneously executing, for a document scanned by one scanning operation, registration, in the full-text-search database, data obtained by subjecting images on

5 Thus, registration of read images in a folder and
registration of text data obtained by executing OCR
processing on the read images can be simultaneously
executed using one instruction button.

Also, in addition to the full text search of the text data by OCR processing, document images can be also retrieved by folder retrieval. This enables the entire system to reliably retrieve document images.

In the second embodiment, a dictionary used during character recognition processing is assigned to an instruction button. This enables recognition of characters on a scanned document using an optimal dictionary for the document based on the instruction button touched by the user when scanning the document.

In OCR processing, a method (sentence analysis method) for analyzing, in addition to recognition processing for analyzing the shape of each character, a word or a sentence constructed by recognized characters to select an optimal one of character candidates is often employed in order to finally correctly recognize each character. In this sentence analysis method, it is important to use a dictionary corresponding to the contents of a to-be-recognized document.

For example, in a document reciting addresses or expertise information concerning, for example, medical practice, many unusual words are used, and hence it is possible that the document will not correctly be recognized if a usual dictionary is used. If, in this case, a dictionary corresponding to the document is used, the efficiency of recognition can be enhanced.

FIG. 7 shows an example of a display screen displaying instruction buttons 71 - 74 that correspond to respective dictionaries used when input document images are subjected to OCR processing. If the instruction button 71 labeled "CLIENT REGISTRATION" is used when scanning a document such as an address list, characters of the address list are recognized using a dictionary concerning addresses and names. Further, when scanning a management document using the instruction button 72 labeled "MANAGEMENT DOCUMENT REGISTRATION", a dictionary concerning management or

economy is used.

The instruction buttons 71 - 74 shown in FIG. 7 are managed by a management table 15a as shown in FIG. 8. As shown in FIG. 8, the management table 15a stores items used for OCR processing, such as "BUTTON NUMBER", "BUTTON NAME", "PRINTING FOR CONFIRMATION", "SEPARATOR RECOGNITION", "DOCUMENT SEPARATION", "USED DICTOINARY", "OCR LANGUAGE", "OCR PITCH" and "OCR TARGET RANGE".

The item "USED DICTIONARY" is used to designate dictionaries corresponding to respective documents. For example, a dictionary concerning names and addresses is set for the instruction button 71 labeled "CLIENT REGISTRATION". Similarly, a dictionary concerning management and economy is set for the instruction button 72 labeled "MANAGEMENT DOCUMENT REGISTRATION". A dictionary concerning architecture is set for the instruction button 73 labeled "ARCHITECTURE DOCUMENT REGISTRATION". A dictionary concerning medical practice is set for the instruction button 74 labeled "MEDICAL DOCUMENT REGISTRATION".

FIG. 9 illustrates an example of a display screen for preparing the instruction button 71 labeled "CLIENT REGISTRATION". In this example, similar items to those in the screen of FIG. 5 are set. Further, in the case of FIG. 9, "WITH OCR PROCESSING" is designated as the panel name, "CLIENT REGISTRATOIN" as the button name,

"CLIENT LIST" as the name of a folder as the destination of registration, and "DICTIONARIES CONCERNING NAMES AND ADDRESSES" as the dictionaries used for character recognition. The contents set for each instruction button are reflected in the contents in the management table 15a of the management section 15 as shown in FIG. 8.

FIG. 10 illustrates an example of a display screen of the display 2a of the data retrieving personal computer 2, used when a document registered in the document management server 3 is retrieved using the computer 2. Using the display 2a of the personal computer 2, the user can retrieve a document, registered in the document management server 3, from the image database 32 having a folder tree structure, and also from the full-text-search database 31 that stores text data corresponding to the document.

In the retrieval using the folder tree structure, the folders registered in the image database 32 are displayed in a tree structure on the display screen of the personal computer 2, thereby enabling the user to select a target folder from the displayed folders.

Further, in the full text (natural language) retrieval, the user can retrieve, using the full-text-search database 31, the entire text data corresponding to images on a target document simply by inputting a voluntarily selected word (a character, a word, a

sentence, etc.).

In other words, when the user has input, to the data retrieving personal computer 2, a word or a sentence as a keyword for retrieving a target document, the personal computer 2 retrieves the keyword from the entire text data registered in the full-text-search database 31 and resulting from OCR processing, thereby displaying, as a retrieval result, a list of document images that contain the keyword.

At this time, those of the document images, which contain lots of keywords, may be determined to be a retrieval result, or may be arranged in order in accordance with the number of keywords contained therein.

When document images have been obtained by the retrieval using the folder tree structure or by the retrieval using the full-text-search function, the data retrieving personal computer 2 displays a list of document images as a retrieval result, as is shown in FIG. 10.

Thus, images on a desired document can be retrieved on the basis of the name of a folder or a management structure, in which the document images is registered, and can be retrieved using a keyword contained therein.

FIG. 11 is a flowchart useful in explaining the process executed in the second embodiment.

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After OCR processing on the read images is

finished, the control section 11 registers the images in a folder contained in the image database 32 and designated by the management table 15a in accordance with the instruction button (step ST17). Subsequently, the control section 11 registers, in the full-text-search database 31, text data (a text document) resulting from OCR processing, together with information indicating the storing place (folder) of the images (step ST18).

After registering the OCR processing result and the images, the control section 11 writes the processing result into an operation log table 15b described later (step ST19), and finishes the process related to the pushed instruction button.

As described above, the conditions for OCR processing executed on document images, and a folder as the destination of registration of the document images are set in relation to the pushed instruction button, whereby an appropriate one of the instruction buttons is used so that OCR processing will be executed under OCR conditions corresponding to the type of a to-be-processed document.

As a result, various conditions for OCR processing corresponding to various types of to-be-processed documents can be set in relation to the instruction buttons, and the accuracy of OCR processing can be enhanced when an appropriate instruction button is used.

Further, the OCR conditions are set in accordance with a language such as Japanese, English, etc., a character pitch such as a standard pitch, a fixed pitch, etc., which are used for OCR processing, or in
5 accordance with the type of a to-be-registered document such as an address list, a medical practice document, a technical document, etc.

Accordingly, only one instruction button enables simultaneous registration of document images and the
10 result of OCR processing executed on the document images, and also enables realization of highly accurate OCR processing according to the type of a to-be-registered document.

In addition, the dictionary used for OCR
15 processing, included in the OCR processing conditions, is set in accordance with the type of a to-be-registered document. This enables OCR processing of high character recognition accuracy according to the type of the to-be-registered document.

20 A third embodiment of the invention will be described.

In the third embodiment, a device is supposed, which is used as a network scanner shown in FIG. 2 and has two functions of image printing and image input as
25 in the digital copy machine 1. This embodiment is characterized in that the user transmits, via a local area network (LAN) to the digital copy machine 1, a

5 The digital copy machine 1 has a function called "private printing". This function is for printing an image, transmitted from an external device to the copy machine 1, when the user has instructed the machine to print the image.

In the third embodiment, the private printing function is used to attach an image, transmitted from an external device, to images read by the digital copy machine 1 as the network scanner 1, thereby forming a document. After that, the obtained document images and text data obtained by subjecting the document to OCR

processing are simultaneously registered.

FIG. 12 is a flowchart useful in explaining the flow of processing executed in the third embodiment. Referring to this flowchart, a description will be given of the operation of transmitting a page as the front cover of a document to the digital copy machine 1 using the private printing function, and causing the copy machine 1 to read document images as the second page, et seq.

First, the user prepares an instruction button (panel button) used for executing OCR processing and registering resultant document images (step ST21). The user also creates a page to be used as the front cover of the document images, using, for example, their own personal computer (data retrieving personal computer) 2 as an external device connected to the LAN 4. This page is a page on which, for example, a sentence input by the user is printed, and data thereon is transmitted to the outside in the form of a character code.

After creating the page as the front cover, the user issues an instruction to execute private printing of the page, using the data retrieving personal computer 2 (step ST22). Subsequently, the personal computer 2 transmits, to the digital copy machine 1, both an instruction to execute private printing, and the page as the target of private printing converted in the form of a character code.

When the digital copy machine 1 has received the page as the target of private printing, the control section 11 converts the received character code of the page into image data and stores it in the memory 16 (step ST23).

After that, the user directly sets, at the image input section 12 of the digital copy machine 1, to-be-scanned and registered document pages after the front page (step ST24). Before scanning the pages, the user selects the instruction button prepared at the step ST21 (step ST25).

Then, the control section 11 displays, on the display 14, guidance "AUTOMATIC ATTACHMENT FOR PRIVATE PRINTING" and the selected instruction button. When the user has selected "AUTOMATIC ATTACHMENT FOR PRIVATE PRINTING" (step ST26), the control section 11 displays a list of images that can be subjected to private printing. The user selects one of the listed images, which they would like to make the front page, by touching the touch panel 14a (step ST27). After the user pushes the read start button (step ST28), the control section 11 reads the set document pages.

After reading the set document pages, the image selected at the step ST27 from the document images that can be subjected to private printing is electronically added as the front cover page of the document images (step ST29). The control section 11 controls the OCR

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5 After finishing OCR processing on the document
images, the control section 11 registers the document
images in a folder contained in the image database 32
and designated by the instruction button (step ST31).
Further, the control section 11 registers, in the full-
0 text-search database 31, both a text document resulting
from OCR processing, and information concerning the
image storage place (folder) (step S32). After
finishing the registration of the document images and
the OCR processing result, the control section 11
5 writes the processing result as an operation log into
the management section 15 (step ST33), thereby
finishing processing concerning the instruction button.

In the third embodiment, a character code, which indicates data on a page to be used as the front cover of a document and is transmitted from an external device using the private printing function, is converted into image data, and is attached as the first page to the other document images and subjected to OCR processing. However, this operation may be modified such that page data constructed by the character code transmitted for printing from the external device is directly registered in the full-text-search database 31.

without being converted into image data.

On the other hand, when registering, in the image database 32, the character code transmitted for printing from the external device, the code is converted into image data.

As described above, in the third embodiment, an instruction to print only the front cover of a document is input from an external device, using the private printing mode, thereby electronically attaching an image, instructed to print as the front cover of the document, to to-be-registered document images, and scanning the other pages of the document. Those of the thus-obtained document images, which are included within the page range set in accordance with the instruction button, are subjected to OCR processing, whereby the document images are registered in a folder, and text data resulting from OCR processing is registered in the full-text-search database.

Thus, a page created by, for example, an external device can be attached to document images actually read by the scanner, and registered as a document image. This can omit the operation of printing an image of a to-be-attached page on, for example, a sheet of paper, and then reading the printed image. As a result, paper and time can be saved.

A fourth embodiment of the invention will be described.

5 FIG. 13 is a flowchart useful in explaining the
flow of processing executed in the fourth embodiment.

The control section 11 then sets a configuration for inputting images on the basis of data read from the management table 15a (step ST43). After the user touches the read start button, the control section 11 starts inputting of images through the image input section 12 (step ST44).

Further, the control section 11 sets a configuration (mode) for OCR processing on the basis of the set contents of the instruction button, which concern OCR processing and are read from the management table 15a of the management section 15 (step ST45).

5 After finishing OCR processing on the input images,
the control section 11 registers them in a folder
contained in the image database 32 and designated by
the selected instruction button (step ST47).

15 Subsequently, the control section 11 registers, in
the full-text-search database 31, the text document
resulting from OCR processing, together with
information indicating the image storing place (folder)
(step ST50). After registering the OCR processing
20 result and the images, the control section 11 writes
the processing result as an operation log into the
management section 15 (step ST51), and finishes the
process related to the selected instruction button.

As described above, in the fourth embodiment, the
25 set contents of the selected instruction button
displayed on the display 14 of the network scanner 1,
such as the name of the instruction button, the name of

5 Thus, not only text data resulting from OCR
processing executed on a to-be-registered document, but
also various data items and/or set values relating to
the document are registered in the full-text-search
database. This increases information that can be used
0 as a clue to a to-be-retrieved document, and hence
enhances the efficiency of full text searching.

The fifth embodiment is characterized in that all recognition candidates used during OCR processing are registered in the full-text-search database 31, instead of the final OCR processing result. This enhances the probability of retrieval of a desired document and is therefore advantageous where there is a recognition error during OCR processing. Accordingly, the efficiency of full text searching is further enhanced.

25 In the sentence analysis, candidates other than the
recognition result of OCR processing are selected by
comparing, for example, each word or sentence with that

recited in a dictionary (not shown). For example, when the dictionary contains a more probable word than that included in the OCR processing recognition result, it is selected as a candidate resulting from the sentence analysis.

FIG. 14 is a flowchart useful in explaining the flow of processing executed in the fifth embodiment.

First, the user designates the name of a panel to which a to-be-used instruction button belongs. Then, the instruction buttons that belong to the panel designated by the user through the touch panel 14a of the display 14 are displayed. The user selects one of the instruction buttons on the display (step ST61). Subsequently, the control section 11 reads attribute data corresponding to the selected instruction button from the management table 15a of the management section 15 (step ST62).

The control section 11 then sets a configuration for inputting images on the basis of data read from the management table 15a (step ST63). After the user touches the read start button, the control section 11 starts input of images through the image input section 12 (step ST64).

Further, the control section 11 sets a configuration (mode) for OCR processing on the basis of the set contents of the instruction button, which concern OCR processing and are read from the management

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result, then a character string including conversion candidates (recognition candidates) is added to a text document as an image recognition result, and the resultant text document is registered in the full-text-search database.

Thus, the efficiency of full text searching is enhanced by executing fuzzy registration in the full-text-search database. In other words, full text searching is executed even on a plurality of recognition candidates, thereby enhancing the efficiency of data retrieval.

A sixth embodiment will be described.

The sixth embodiment is characterized in that when reading a plurality of documents at one time, information indicating the end of each document (separator information, a page separator) is detected, and then an area or a character used as a page separator indicating the end of each document is erased. The page separator is used to enable automatic recognition of each document end, and is not necessary for full text search of each document. Unnecessary information can be removed from document images by erasing the page separator therefrom, which enhances the efficiency of full text searching.

In the sixth embodiment, the OCR processing section 13 is supposed to have a function of recognizing the page separator. The process of

recognizing the page separator will be referred to as "OMR processing".

5 The page separator is formed of a predetermined symbol or character, or a predetermined character string recited in a predetermined area. Alternatively, a separator sheet containing predetermined contents may be used so that the entire sheet is recognized as a page separator.

10 When, for example, recognizing a page separator formed of a symbol specified in a predetermined area of a read image, the OCR processing section 13 recognizes the page separator if the symbol indicating the separator exists in the predetermined area. Further, when recognizing a page separator formed of a
15 predetermined character string, the OCR processing section 13 recognizes the page separator if the character string indicating the separator is recognized as a result of OCR processing executed on a read image.

20 FIG. 15 is a flowchart useful in explaining the flow of processing executed in the sixth embodiment.

First, the user designates the name of a panel to which a to-be-used instruction button belongs. Then, the instruction buttons that belong to the panel designated by the user through the touch panel 14a of
25 the display 14 are displayed. The user selects one of the instruction buttons on the display (step ST81). Subsequently, the control section 11 reads attribute

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data corresponding to the selected instruction button from the management table 15a of the management section 15 (step ST82).

5 The control section 11 then sets a configuration for inputting images on the basis of data read from the management table 15a. After the configuration for inputting images is set and the user touches the read start button, the control section 11 starts input of images through the image input section 12 (step ST83).

10 After starting the input of the images, the control section 11 sets a configuration (mode) for processing (OMR processing) for recognizing a page separator using the OCR processing section 13 (step ST84). After setting the configuration for OMR
15 processing, the control section 11 controls the OCR processing section 13 so as to execute OMR processing on the images input through the image input section 12 (step ST85).

20 Then, the control section 11 sets a configuration for OCR processing on the basis of the set contents of the instruction button concerning OCR processing and read from the management table 15a of the management section 15 (step ST86). The control section 11
25 controls the OCR processing section 13 so as to execute OCR processing on the input images under the set OCR processing configuration (step ST87).

After finishing OCR processing on the input images,

Where the page separator is formed of a figure or
5 a symbol specified in a predetermined area, the area
recognized as the page separator by OMR processing is
painted with a background color (i.e. the area is
erased). Further, where the page separator is formed
of a predetermined character string (a key character
0 string), the key character string recognized as the
page separator by OMR processing is erased (step ST89)

As described above, in the sixth embodiment, an instruction button is set for inputting an instruction to divide, into two steps as follows, OCR processing executed after one scan operation, and then to execute the two steps simultaneously.

Step 1: To determine a document range (page range)
from scanned images and execute OMR processing for

automatic division (separator detection and document page division).

Step 2: To erase separator information for OMR processing from each document image resulting from OMR processing, and then to extract a search key (including a full text search key) and execute OCR processing for registration.

A key character string used at the step 1 for recognizing the first page of each document, i.e. information indicating the page separator, is erased at the step 2, thereby registering the OCR processing result in the full-text-search database.

Since information irrelevant to the contents of each document is erased and hence not registered in a database, the efficiency of full text searching is enhanced.

A seventh embodiment will be described.

The seventh embodiment is characterized in that the confirmation printing function for a scanned image is applied to confirmation of an OCR processing result such that the OCR processing result is printed as one page to be added to scanned document images. In the seventh embodiment, a device having a printer section, as shown in FIG. 2, is supposed to be used.

FIG. 16 shows an example of a confirmation printing result obtained by printing a processing result by a printer section 16 for confirmation.

As shown in FIG. 16, in a confirmation printing result of a processing result, a scanned document image is printed on a left-hand portion of a printing medium, and a text obtained as a character recognition result of the left-hand portion is printed on a right-hand portion of the printing medium. Thus, a network scanner or a digital copy machine, which does not have a function of displaying an image immediately after the image is scanned, can confirm, by printing, the scanned image and its OCR processing result. This is very advantageous since it can be determined, for example, whether or not the image must be input again, immediately after it is scanned.

FIG. 17 is a flowchart useful in explaining the flow of processing executed in the seventh embodiment.

First, the user designates the name of a panel to which a to-be-used instruction button belongs. Then, the instruction buttons that belong to the panel designated by the user through the touch panel 14a of the display 14 are displayed. The user selects one of the instruction buttons on the display, which designates confirmation printing (step ST101). Subsequently, the control section 11 reads attribute data corresponding to the selected instruction button from the management table 15a of the management section 15 (step ST102).

The control section 11 then sets a configuration

for inputting images on the basis of data read from the management table 15a (step ST103). After the user touches the read start button, the control section 11 starts input of images through the image input section 12 (step ST104).

Further, the control section 11 sets a configuration (mode) for OCR processing on the basis of the set contents of the selected instruction button, which concern OCR processing and are read from the management table 15a of the management section 15 (step ST105). Upon inputting images, the control section 11 executes OCR processing on the input images under the set OCR processing configuration (step ST106).

After finishing OCR processing on the input images, the control section 11 prints, on a paper sheet, a to-be-confirmed image and a text resulting from OCR processing, using a printer section 17 (step ST107).

Then, the control section 11 registers the images in a folder contained in the image database 32 and designated by the selected instruction button (step ST108). Subsequently, the control section 11 registers, in the full-text-search database 31, the text document resulting from OCR processing, together with information indicating the image storing place (folder) (step ST109).

After registering the OCR processing result and the images, the control section 11 writes the

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processing result as an operation log into the management section 15 (step ST110), and finishes the process related to the selected instruction button.

As described above, the device of this embodiment
5 has a function of executing confirmation printing of a scanned image, and prints a document image and a text resulting from OCR processing on the image when executing confirmation printing.

This function enables a network scanner or a
10 digital copy machine, which does not have a function of displaying an image immediately after scanning it, to immediately confirm the scanned image and its OCR processing result by printing. As a result, the necessary, for example, of re-input of the scanned
15 image can be determined instantaneously.

An eighth embodiment will be described.

In the eighth embodiment, the network scanner 1 is supposed to have an allowable maximum value section 116 for managing a maximum scanning data amount for each
20 document, and a size determining section 117 for determining whether or not a scanned document image exceeds a predetermined allowable value, as is shown in FIG. 18.

A digital copy machine as the network scanner 1
25 employed in the eighth embodiment can be used freely by the user to scan a document and transfer electronic data indicating the document to another device on the

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network. The user may use the machine to scan a large amount of image data and transfer a large amount of data to the network, thereby adversely influencing the entire network. To prevent this, it is very useful to employ a function of in advance setting a maximum scan data amount for each document.

However, when, in this case, the data amount exceeds the maximum allowable value, it is necessary to, for example, re-scan a document. In light of this, a more efficient operation system is required.

To meet the requirement, the eighth embodiment is characterized in that when image data amount on each scanned document exceeds the maximum allowable value, only text data resulting from OCR processing executed on the image data is registered, and a message "the image data itself was not registered since the image data amount exceeded the maximum allowable value" is stored as an operation log in the management section 15.

As shown in FIG. 18, in this network system, the allowable maximum value section 116 manages the maximum data amount for each document to be scanned by the network scanner 1, and the size determining section 117 determines whether or not the data size of each scanned document exceeds the maximum data amount managed by the maximum value section 116.

Moreover, the network scanner 1 stores, in the management section 15, an operation log indicating a

5 In the data item, a date at which certain process
was executed is stored. In the event level item,
"NORMAL TERMINATION" is written when the certain
process terminated normally, and "WARNING", for example,
which indicates a certain error level, is written when
10 the certain process terminated erroneously.

Thus, when the data size of each document has exceeded the maximum data value managed by the maximum value section 116, the control section 11 stores the contents of the error as an operation log in the management section 15, as is shown in FIG. 20. This

operation log enables the user to confirm the contents of the process later.

FIG. 15 is a flowchart useful in explaining the flow of processing executed in the eighth embodiment.

5 First, the user designates the name of a panel to which a to-be-used instruction button belongs. Then, the instruction buttons that belong to the panel designated by the user through the touch panel 14a of the display 14 are displayed. The user selects one of the instruction buttons on the display (step ST121).
10 Subsequently, the control section 11 reads attribute data corresponding to the selected instruction button from the management table 15a of the management section 15 (step ST122).

15 The control section 11 then sets a configuration for inputting images on the basis of data read from the management table 15a (step ST123). After the user touches the read start button, the control section 11 starts inputting of images through the image input section 12 (step ST124).
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Further, the control section 11 sets a configuration (mode) for OCR processing on the basis of the set contents of the instruction button, which concern OCR processing and are read from the management
25 table 15a of the management section 15 (step ST125). Upon inputting images, the control section 11 controls the OCR processing section 13 so as to execute OCR

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As described above, where the data size of scanned images exceeds a predetermined allowable value, the

images are not registered and only a text as a recognition result is registered. Further, the contents of this process are stored as an operation log.

As a result, when the data size of the images is too big and hence they cannot be registered, only text data is registered as required minimum data, which makes re-inputting of the images unnecessary.

Thus, the present invention can more facilitate the operation of the system by the user and can enhance the performance of OCR processing, the system being configured to use a network scanner that includes a scanner function incorporated in a digital copy machine, and to manage document images by registering them in a document managing server, together with the result of OCR processing executed on them.

Further, in this invention, scanned document images are subjected to OCR processing and registered in a folder which is contained in an image management database for managing images using a folder structure, and which is designated by the user. At the same time, the OCR processing result of the images is registered in a full-text-search database. The images can be retrieved from each of the image management database and the full-text-search database.

Furthermore, in this invention, the user prepares instruction buttons, before inputting document images, for designating a language, a character pitch, a field

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to which a to-be-scanned document belongs (address data, medical practice information, etc.) in order to enhance the effects of OCR processing executed on the images (such as the rate or processing, the rate of recognition of characters by automatic selection of a special dictionary prepared for the recognition). These instruction buttons are displayed on a display and selectively used before the images are input.

Also, in this invention, data related to OCR processing and the registration destination (a server, a folder, etc.) of each document can be simultaneously designated by a single panel button. Accordingly, the user can set all processes necessary for a to-be-scanned document simply by selecting one of buttons on the display when using the scanner.

Although, in the system structure shown in FIG. 1, 2 or 8, the network scanner 1 is physically separated from the document management server 3 but interactively connected thereto by a certain network, the function of the server 3 may be incorporated in the network scanner 1.

As described above in detail, the invention can provide an information input device for the user easy to use and capable of efficiently retrieving a registered document image with maximum character recognition accuracy.

Additional advantages and modifications will

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readily occur to those skilled in the art. Therefore,
the invention in its broader aspects is not limited to
the specific details and representative embodiments
shown and described herein. Accordingly, various
5 modifications may be made without departing from the
spirit or scope of the general inventive concept as
defined by the appended claims and their equivalents.

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